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ABSTRACT

A freshman humanities course in reading and research was used by three English instructors to investigate the appropriateness of having students use an online database as a research tool. The results show that the acquisition of basic online database search skills is not qualitatively different from that of more traditional research skills. Learning the use of a database can also teach students to think more clearly about narrowing and refining their research topics and to see their subjects in relation to broader and more varied scholarly contexts. Student responses were varied, and several students said that database searching was their first computer experience. The most important pedagogical finding and the source of most positive reactions was that searching provides an efficient way, through the conference at the terminal, for teachers to watch students progress in the development and refining process. Most negative reactions resulted directly from the unavailability of databases in specific subject areas, particularly in the humanities. Expansion of the project with full university support is planned. Six reference notes are included. (LMM)

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Composition Students On-Line

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Composition Students On-Line:
Database Searching in the Undergraduate Research Paper Course

In the December 1982 issue of College English, James Ford and Dennis R. Perry reported that research paper instruction is now being offered in 84.09% of all freshman writing courses.[1] Despite brisk debate among departments over what kind and amount of research should be required--and even over whether there is such a thing as a "research paper" in a writing course,[2] it is clear that a strong majority of Freshman writing programs now offer, and often require, a composition course that introduces students to library research and bibliographical form and that requires them to write a 7-15 page paper analyzing the results of their research.[3] Most Research Paper courses teach students to develop topics and find information, skills that they will be expected to use in upper-level college courses.

The second course in Drexel University's freshman Humanities Sequence, "R102: Reading and Research," is typical of many freshman research courses around the nation. Sections of the course use a variety of subjects, from "Science, Technology and the Humanities" to "Contemporary Social Issues," to "American Ethnic Identity," to "Autobiography." All sections focus on analysis of readings in the subject area, include introductions to research methods and to the use of the library, and require an 8-10 page research paper, usually in the subject area. Because of increasing University interest in the instructional uses of computer technology, we began to wonder, in 1983, whether some introduction to the powerful information gathering tools now available through commercial on-line databases might be appropriate in R102. And rather than simply mention the existence of databases, and the search service provided in the library, we wondered whether we could teach students sufficient knowledge of the system commands and logic to do searching themselves. While we began this experiment with the idea of giving the students access to a powerful new information-gathering technology, we soon discovered that the process of learning to use a computerized database can also teach students to think more clearly about narrowing and refining their research

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topics and also to see their subjects in relation to broader and more varied scholarly contexts.

Perhaps the most commonly debated issue in discussions of Research Paper courses has been over the purpose of research paper instruction. Robert Schwegler and Linda K. Shannon have shown, for instance, that students tend to perceive Research Paper assignments primarily as information gathering exercises. Instructors, on the other hand, see the freshman research paper assignment as engaging the students in a process of discovery and analysis that feeds into their writing.[4] Instructors who teach the research paper hope to see their students gain an awareness of kinds of scholarly contents and methods of investigation as well as an understanding of the relationships between a specific piece of data and a subject area and between a well-defined, limited topic and a broader subject area. Schwegler and Shannon suggest that ideally, the search for information on which students embark in a Research Paper course should serve, not as an end in itself, but as a means of teaching the analytic skills needed in many kinds of academic writing. In practice, however, it is often difficult to separate the information-gathering from the discovery process. Thus instructors are always looking for ways of teaching the process of information-gathering so that students learn to define, discover and narrow their topics as they work on their papers. The R102 database project at Drexel has suggested one way that computer technology designed as an information-gathering tool can also work as a pedagogical tool for teaching students some of the basic analytic skills needed for research.

In our initial experiment we constituted a group of three English instructors, eager to teach our students about databases, but well aware of our limited knowledge in this area. We quickly dispensed with the idea that we would become experts in the theory and structure of databases: this was not our area of expertise, nor did it need to be. Instead, we decided to develop the body of knowledge experientially, as a product of work with databases in our own research. We understood databases to be extensions of those more traditional resources, the index and the bibliography. We understood that we had been using "databases" all along,

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when we had consulted, for example, the bound volumes of the MLA Bibliography in the library. But we also appreciated the advantages of going "on-line." When using electronic databases, we could search at once all of the years that were indexed. We had also been impressed by the quick update that good databases provide - in the best cases all of the periodicals of a database have been indexed by the end of the month in which they appear. We had benefitted in our own research from the presence of abstracts in the citations of good databases. And we knew that by entering the right terms we could search beyond the traditional subject-oriented compartments of the bound index or bibliography. We decided that this experience would be the base of the new "body of knowledge" we would be introducing to our students.

Our own experience also gave us a sense of the details to which we would have to expose our students. The simplest part was the technological part: the commands that are needed to operate the system. BRS, the database system we were using, has about a dozen commands; we decided to limit our students' training to the commands they would use most, for searching, printing, changing databases, and getting off the system. This was very much the "tip of the iceberg approach," but it would give students enough information to operate effectively. The next easiest part was discussing the basics of Boolean logic - mainly *and* and *or* - because the terms they would be entering - the operators - were controlled by these "operands." We found this material relatively easy to introduce, and as English teachers we were amused at our ability to convey this kind of direct, "technical" information. None of us, after all, had ever pictured ourselves teaching Boolean logic in our English courses.

The hardest part, however, was non-technical: to use database searching effectively, users have to develop a sophistication in the use of the terms used in searching, that is, they must learn to choose the particular words that will best identify the kind of information they seek. Database searching deals in pattern matching, in equality. There are two kinds of terms one can enter, "controlled vocabulary" and "free text." Controlled vocabulary terms are devised by the compilers of databases. If the user is dealing with controlled vocabulary, he or she is essentially using a subject guide, and simply needs to know the thesaurus of subject

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headings - or "descriptors," as they are called in the world of electronic databases. A controlled-vocabulary search becomes, therefore, an electronic version of using the subject card catalog or a subject-oriented index. Controlled vocabulary searching demands a bit of research beforehand to discover the descriptors that are used in the editorial preparation of the given database. This had been the kind of searching we had experienced when doing searches with a librarian.

But the more interesting way of using databases is to do free text searching, which seeks pattern matching - equality - with any of the words in the citations of the database. With free text searching, students have to learn that they are not dealing with ideas, but rather with terms to be matched. When doing research, students, particularly freshmen, tend to seek topics and information under general concepts. They see themselves doing research in "psychology," for instance, or in "hormones." What they need to understand is that a given article in psychology will not necessarily contain the term "psychology." Studies of hormones may well not contain the term "hormones"; they are more likely to contain the names of particular hormones. And a given term may have various forms, the most obvious variant being the plural form. Articles on "children," for example, may contain the word "child" rather than "children"; one can truncate terms with a dollar sign - "child$" will cover "child" as well as "children" (and "childish," and perhaps a few other things) - , and this detail needs to be introduced both as a tool and as a lesson in "patterns" rather than "ideas." This conceptual shift - to the words that will actually appear in a citation, rather than the "ideas" the referenced article is about, - is hard to convey, but it is essential to on-line database searching techniques.

All of this training directs the student toward a "do-it-yourself" approach that is relatively new to the world of electronic information retrieval. Traditionally, a search is seen as an event requiring an intermediary. The researcher, a person who would normally be expected to use the card catalogue, indexes and other tools independently, and who, indeed, should hesitate to approach the library's reference desk without having exhausted all of the skill that is assumed in an educated adult, is portrayed in Information Science literature as someone who grows passive rather quickly in the face of electronic information retrieval. In traditional

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research, the researcher must have the ideas but also the technique; when computers enter, the researcher still has the ideas, but must appeal to a professional for the technique. In a standard text in the field of Information Science, a chapter entitled "The Presearch Interview" describes the researcher who wishes to use an electronic database as a person without technique, the kind of library user who goes to the reference desk first. An "information requester" is distinguished from an "information specialist": "the interviewing skill, professional knowledge, and experience of the librarian helps to make the transistion from first to best question so that the search by either the requester or the librarian can be more successful and efficient." Database searching, it is assumed, is not as easy to learn as more traditional library tools. "For example, once the library catalogue or printed abstracting service is explained, it is easy to use it again and again. However, for the on-line search, special skills that are time-consuming to explain to the user need to be employed. Today, the requester is rarely given instructions on how to do the search on-line alone." [5]

At first glance these arguments sound valid. Certainly the skills necessary for complex and highly efficient on-line searching need to be acquired. But our experience shows that the acquisition of very basic on-line database searching skills is not qualitatively different from the acquisition of more traditional research skills. While we do not claim that freshmen can be taught to do searches as efficent or as economical as those that more sophisticated information scientists may do for their clients, we do find considerable value in training students in the rudimentary logic of these techniques. If the resources are available, the researcher will use them often enough to keep in practice, and will gradually develop more sophisticated approaches of his or her own. The traditional approach to on-line searching claims that the mediated search improves the research itself by moving from the "first" to the "best" questions. But research includes a process of discovery, and on-line database searching enhances that process by teaching the student researcher to move, without intermediaries, toward successively "better" research questions. Built into the idea of the intermediary and the presearch interview is the notion that all of the important decisions about what one is looking for have been

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made before the search itself, and largely by someone else; the focus is on the "product" of the search rather than on the process. In some cases, and at some stages of more advanced research, this is certainly true, and the focus on the product also makes for much more economical use of the technology. But the researcher who needs to explore - the freshman research paper writer, for example - will profit from unmediated "hands-on" experience of the exploring process that on-line searching provides.

We have seen that in developing a search strategy students must come up with terms that define their topics and combine these terms to focus the search. Before the on-line session, students were required to go to the library to consult the standard printed indices, as well as thesauri published by the database vendors. Their next assignment is to devise simple "search strategies" before they come to the terminal. For example, one freshman, Emily, wished to write a paper on "violence in sports." Her instructor immediately recognized, as most instructors would, that this topic was still too broadly defined, but it is difficult for a student to see why such a topic is too broad until he or she actually begins looking for research materials. The steps that the BRS system requires a searcher to follow took Emily quickly through the process of refining a topic.

First, she needed to decide <u>what aspect</u> of "sports and violence" interested her in in order to decide which of the databases on BRS to begin searching. If she wanted to know, for example, about the medical aspects of sports violence - kinds of injuries, therapies, etc. - she should choose a medical database, MESH, and look for articles in the area of sports medicine. If, on the other hand, she were interested in sports and violence as a sociological phenomenon, then <u>Social Science Abstracts</u> would be an appropriate database to search. The database decision can be made in a class discussion before the student ever sits down at a terminal, as a supplement to the usual discussion about choosing the proper indexes in the library.

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Now Emily is sitting at the terminal, prepared to do a search in Sociological Abstracts using "sports" and "violence" as her terms. As soon as she enters these terms, she will begin to see that her topic is too broadly defined. Here is what the printout says:

1: sports and violence
RESULT: 40

The Result message indicates that there are 40 items in Sociological Abstracts which contain both the word "sports" and the word "violence." It would be inefficient for this student to try to consult all of them.

Emily therefore needs to discover more specifically what kind of thing she wants to know about violence in sports. Is she interested in a particular sport? Is she interested in professional sports or in amateur sports? The result offers a perfect opportunity for the instructor to ask a few logical questions to help Emily define her topic more clearly. This approach confronts her simultaneously with the need to devise good free text terms and the problem of narrowing the research topic. She finally decides that she is really interested in finding out how widespread violence is in college sports and how it affects the athletes. To further limit her search, then, she needs to add the keyword "college" to the set already defined. Since some articles on this subject may contain the word "university" or "universities" rather than "college" the student should use both terms:

2: 1 and (college or universit$)
RESULT: 6

Now Emily has a much more limited set, and she is ready to print out the results to see which references are likely to be useful to her. In fact, we usually tell our students that a good search on a database is one that has been narrowed down to 20 or fewer "hits." And they learn rapidly that, assuming the database contains articles on their subject area, the fewer "hits" they find, the more likely it is that they are finding the documents they need.

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At this stage, the on-line searching technology adds something to the research paper conference that is not ordinarily available to the instructor: it allows the instructor, sitting with the student at the terminal, to "walk through the library" with the student, looking at the bibliographic entries, talking about what kind of document each entry seems to describe and discussing how to tell whether a reference will be worth pursuing, by looking at title, journal, date, publisher. The instructor can ask the student what a given reference is likely to be about and whether that is what the student wants to know about the topic. Scholars know these things instinctively, but students usually need to learn them. A five-minute discussion of the print-out from a database search can teach a student a great deal about the kinds of decisions he/she needs to make in locating materials for a paper. It can also reveal much to both teacher and student about what the student is <u>really</u> interested in researching. The student studying violence in college sports, for example, might find that the articles in Sociological Abstracts don't quite tell her enough about <u>why</u> college athletes become involved in violence on the field. Her next step might be to do the same search on the <u>Psychological Abstracts</u> database, to see what different articles and different slants she finds there. Both <u>Sociological Abstracts</u> and <u>Psychological Abstracts</u> provide abstracts of the articles indexed. So this student should be encouraged to ask for printouts of the abstracts for each article that looks promising. We have found that we generally learn much more, after a fifteen-minute conference at a terminal with a student, than we learned in the traditional twenty-minute "so what is your topic" conference that we usually schedule for week three or four of Drexel's ten-week term. And the students seem to have much clearer ideas, much earlier in the term, about the limits and directions of their topics.

We have said that while on-line databases were designed as information-gathering systems, we found that the interactive search methods one learns in order to use a database prove to be invaluable pedagogical tools, especially in conferences, at the terminal, on students' topics. TERM and CROS, two databases specific to BRS and designed for specialized information gathering purposes, also prove useful as pedagogical tools. TERM, a database specific to BRS, is designed to help searchers locate the restricted vocabulary terms in each database. It can

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also function as an "on-line thesaurus" for the student unsure about how to find the words to define his or her topic. Another freshman in R102, Jim, knew he was interested in researching "some aspect of technology," but he had little idea where to go from there - and obviously had not faced up to how broad that "subject area" designation was. We entered "Technology" into TERM and asked to see only the titles of the 26 entries in which "Technology" was given as a synonym for something else. The listing included such key words as "Alternative Energy," "Solar Energy," "Television," "Computer Crimes, and "Communications Media." This printout demonstrated dramatically how huge the field of "technology" was, but it also offered some useful subjects within that broad area. Jim then asked to see the "free text" paragraph of the entries entitled " Solar Energy," "Alternative Energy Sources" and "Computer Crimes" - TERM replied with a list of synonyms that would be helpful to the student, not only in finding words to type into the BRS system, but also in finding the words to describe what topic really interested him. Once he had decided that "computer crimes," would be his topic, Jim still needed to decide whether he was interested in financial crimes, like "Computer embezzlement" or invasions of privacy - topics suggested by the keywords "Computer Privacy" and "Espionage with Computers."

The database CROS searches all BRS databases in the Social Sciences. A searcher can enter search terms into CROS and find out how many times those terms appear in that combination in each database. CROS is a particularly useful resource for students who are unsure about which database to select, or for students who have very limited search terms. One student in the R102 project, for example, wished to find what kind of information was available on "punk rock." After trying unsuccessfully to locate this term in several databases, he entered the term into CROS and found that it appeared only about 3 or 4 times in each of about 5 or 6 databases. He then moved to each of these and did a search. The value of CROS in this instance was that it reassured the student who claimed there was "nothing" on his topic anywhere. He might still have difficulty locating in the library some of the documents turned up on the search, but there is a good deal to be said for teaching students that the information they seek does exist somewhere "out there." Too often, students think of their own university library as the sole repository of information. Electronic

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searching, even when it does not help directly with their papers, can give students a more realistic view of the kind and variety of information that is produced in our society.

Most of these insights came to us during our initial experiment, which involved three sections of R102 - perhaps 70 students. But during the year there are about 90 sections - involving 1800 students, and 40 faculty members - of this required course. Was it possible to implement database searching for all of these sections, and students, and faculty?

The answer to this question is yes, but it took more planning - and financing - than is typical for an "English" course. We had to duplicate for others the initial process we ourselves had gone through, and we had to make the searching activity compatible with the various versions of the course as they existed in our diverse department. Implementing a large-scale project like this requires the commitment and cooperation of the administration, for database searching requires equipment and money. Fortunately, at Drexel we did not have to persuade the administration too much, because Drexel was introducing microcomputers into the undergraduate curriculum in 1984, and the administration was already committed to computer-related course development. But others might find that a shift in perception is necessary. If university administrators are going to provide the funds for the searching and the expertise to arrange the necessary contract with a database vendor, they will have to come to see that an English course may well approach the financial scale of a science course, with laboratory expenses and/or fees, and equipment. Suddenly a humanities course needs a budget. This has some interesting side effects, not the least of which is earning some new attention for the "shabby curate."

But what of the students' responses to this new material? From this year's experience, we can report several different kinds of responses. A small group of students said that database searching was their first exposure to any kind of computer experience. While we had not thought of ourselves as being in the business of erasing computerphobia, this turned out more than once to be one of the effects of our project. One student wrote, "I was surprised when I walked in. I had pictured it to look much

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different. I thought there would be huge computers and I would be scared to death because I wouldn't know what to do. I was wrong." This kind of response was infrequent, however, and will become even less frequent in the coming years. Most students focussed on the practical issue of whether or not database searching helped them with their assignment, to write a research paper. In many cases students responded as we had anticipated: they found the first help that database searching provided was not specific bibliographic references, but rather a general assist in refining a topic. "When first using the search I was not sure of my topic," wrote one student. "After surveying some of the ideas I came up with a more solid structure to work with."

The next issue was whether or not students actually found bibliographic citations that they could use in their papers. Successful results depended very much on the subject matter of the paper, and the availability of an appropriate database in the subject area. Here the realities of the marketplace came into play: students who wanted to do papers on subject matters in the humanities were far less likely to have success than were students doing papers on subjects related to business or to the sciences. The humanities do not support electronic data bases as well as other disciplines, largely for financial reasons.

We had thought that the benefits of database searching would be clear even if the particular assignment of the moment did not benefit, but we were wrong. Students' attitudes towards the usefulness of database searching were directly connected to its practical benefit for their particular assignments. At the end of the term we asked students to respond to a brief questionnaire. Two of the questions asked for the number of entries in the final bibliography of students' papers and the number of those entries that were found through database searching. If the correlation between those numbers was high, other questions eliciting attitudes on the usefulness of the searching, and whether the student would want to do it again, were answered positively. If the numbers did not correlate, meaning that most of the bibliographical entries were found in traditional indexes or by some other means, the responses to the general usefulness of databases tended to be negative. These responses, incidentally, support Schwegler and Shannon 's contention that students

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tend to perceive the research paper as an information-gathering exercise, rather than a process of discovery and analysis, so perhaps we should not have been surprised.

Another interesting barometer of attitudes toward the experience came from a program we set up called "free searching." After the initial sessions with the instructor, students were permitted to go back to the searching facilities and do searching on their own, on any topic they chose. They were not limited to the subjects of their papers, and they did not have to tell anyone what they were searching for. The incidence of return searching was high. Return searching gives a good indication of the self-confidence attained by many of the students. And it correlates with another set of questions on our questionnaire: on the whole, students responded favorably when asked whether they wanted these facilities in the future, and, indeed, whether they would be willing to pay for the service themselves.

The Drexel experiment with on-line database searching in the Freshman Research Paper course has taught us several different kinds of lessons, all potentially useful to teachers of English in this technological era. First, we have begun to introduce ourselves and our students to a powerful new tool for retrieving information, a tool that is likely to be indispensible to all kinds of research in the near future. Second, as we have shown, the particular skills required to use on-line database searching technology force students and instructors alike to pay more conscious attention to the process of developing, refining and analyzing a topic. Furthermore, database searching provides an efficient way, through the conference at the terminal, for teachers to watch the students' progress in the developing and refining process. This was the most important pedagogical result of our first, rough experiment, and it has been the source of most of our positive reactions from students and faculty. Based on these reactions, we expect to continue the R102 project in future years, with full university support, improving it through the addition of new databases and the provision of opportunities for students and faculty to continue doing searches on their own after R102. In short, we expect that students will come out of their freshman Research Paper course knowing how to use a new technological tool that will be as useful in their later

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university work as the other writing and research skills taught in that course have always been.

But the implementation of this experiment has also brought some insights whose implications for teachers and students in the humanities are more far-reaching. Negotiation with the database vendor provided us with a learning experience in the larger world of information retrieval. This educational enterprise is also a commercial one, and BRS responded not only with an innovative commitment to the educational aspects of our project, but also with an awareness of the future market potential of waves of students. People have the tendency to stay with the computer systems they first learn - retraining has the reputation of being too painful - and our educational innovations parallel a current movement in the database industry toward the individual, rather than the institutional, user. Commercial databases have been around since 1972, when Lockheed Corporation's DIALOG, originally developed for the National Aeronautics and Space Administration, became more widely available. Database searching evolved into something one could use in the larger libraries as a supplement to traditional research methods. But, as we noted earlier, the actual searching has been perceived until recently as the domain of experts in information retrieval. The world of database services seems to be at the point where the computer industry was at the advent of the personal computer: the developments in the industry are toward information retrieval at home and in the office, and the searcher has become the person who wants the material for his/her own use. All one needs is a personal computer, a modem, some software, and an account number with a vendor. What used to take hours and the sources in more than one library now takes minutes, and one place of work; and the results derive from the widest possible array of information sources.[6] So we have found ourselves, quite by surprise, in the midst of a major movement in society.

It is worth emphasizing that most of the negative reactions to the project that we heard from students and faculty resulted directly from the unavailability of databases in particular subject areas - the fact that students doing papers on humanistic topics could not find information on their particular topics because BRS did not offer a database in their area.

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These problems come about largely because there is not yet a large market for good databases in the humanities; there are not enough humanists "on-line" to make it profitable for vendors to offer, at educational discounts, databases relevant to the study of language and literature. In a sense, then, the problems that we have encountered in the Drexel experiment suggest an opportunity for teachers in the Humanities. By exposing themselves and their students in freshman English classes to database searching techniques, and by involving vendors in our educational efforts, English instructors and liberal arts administrations should be able to create a greater demand for databases useful to the pursuit of scholarship by the "end user" working in literature and the humanities. The use of on-line database technology in the humanities classroom, in short, offers an opportunity to appropriate for our own discipline a technology that has already enhanced research in other scientific, technological and professional disciplines and whose potential for individual scholars, teachers, and students in the humanities still remains to be fully explored.

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NOTES

[1] James E. Ford and Dennis R. Perry, "Research Paper Instruction in the Undergraduate Writing Program," College English, 44, (1982), 825-831.

[2] Richard L. Larson, "The 'Research Paper' in the Writing Course: A Non-Form of Writing," College English, 44, (1982), 811-816.

[3] Ford and Perry, op. cit.

[4] Robert A. Schwegler and Linda K. Shannon, "The Aims and Process of the Research Paper," College English, 44, (1982), pp. 817-824.

[5] Charles Meadow, Basics of Online Searching, New York: Wiley, 1981, pp. 25-26.

[6] See, for example, Craig Zarley, "Dialing into Data Bases," Personal Computing, 7, (1983), 135-139; "All the Data You Will Ever Need," Business Computer Systems, 2, (1983), pp. 51-55; "Facts and Figures for Penny-Wise Night Owls," Business Computer Systems, 2, (1983), 43-44; John Markoff, "The 'On-Line' Society," Computer World, 17, (1983), 75-76.

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